Flood Contingency Plan
North Marsh Waste Remediation
Bailey Disposal Site

INTRODUCTION

This Flood Contingency Plan (Plan) presents general procedures to be carried out in the event flooding is predicted at the site. The Plan shall be implemented if the predicted flood elevation is to a level that remediation activities must be temporarily suspended until the threat of flooding has passed.

The design for the North Marsh Waste Remediation allows for two active areas to be open at any given time (i.e., one disposal cell and one marsh active area). Each marsh active area has been sized to accomplish waste removal over an estimated period of no more than five working days. The following presents a contingency plan that will be implemented in the event a flood is predicted at the Bailey Site.

WEATHER MONITORING

HLA's site manager or his designee will monitor the weather on a daily basis for inclement weather in the form of heavy localized rainfall or flooding from the Neches River water shed. Once inclement weather is predicted, HLA will monitor weather reports for expected conditions.

FLOOD PREPARATION

The following two conditions will dictate what procedures are followed in securing the open active areas for a flood event.

1. Response time; and
2. Predicted flood elevation.

The following two response scenarios were developed to address these two conditions. HLA and the Contractor shall decide which scenario is most appropriate based on the expected flood event.

Case 1 - Flood Elevation is predicted greater than 4.0 feet MSL

1. HLA notifies Contractor that a flood is predicted;

2. Contractor determines and advises HLA on the time required to finish waste removal and stabilization activities for open marsh active area, and time required to secure active disposal cell by placing one foot of general fill over

801392A

stabilized waste;

3. HLA and Contractor evaluate required response time versus available response time, and proceed as follows.

   A. Adequate Available Response Time - Contractor finishes waste removal and stabilization activities for open marsh active area, and Contractor secures disposal cell by placing one foot of general fill over stabilized waste.

   B. Inadequate Available Response Time - Contractor forgoes 3.A. and proceeds to 4.

4. The contractor shall flood the contained marsh area by opening valves located at the east and west ends of the marsh perimeter dike system. The contractor shall then remove a ten foot section of the northern most portion of the west intermediate earthen dike to approximately elevation 1-ft MSL to allow a controlled entry of flood water into the open active area. If there is waste present in the open marsh active area, the contractor shall then flood this area by pumping water from the surrounding area until the water level begins to overtop the lowest portion of the intermediate earth dike.

   The contractor shall remove a 6-ft wide portion of the North Dike in each disposal cell to an elevation 1-ft higher than the cover that was placed over stabilized waste, or above the bottom of the empty cell.

5. Contractor secures remaining area by moving materials and equipment to high ground; and

6. The site is evacuated.

<u>Case 2 - Flood Elevation is predicted less than 4.0 feet MSL</u>

1. HLA notifies contractor that a flood is predicted;

2. The entire area surrounded by the temporary marsh perimeter dike will be isolated from the surrounding marsh by closing valves installed in the perimeter dike system. These valves will be kept closed until the threat of flooding has passed.

3. Contractor secures remaining area by moving materials and equipment to high ground; and

4. The site is evacuated, if necessary.

POST FLOOD ACTIVITIES

Once the flood has receded and site access is possible, site conditions will be visually surveyed. Water remaining in the active areas after the flood waters recede will be observed for visible signs of contamination, e.g. sheens on the water. The following procedure will be followed, depending on the observed conditions.

A. Flood water that is visually free of waste/contamination will be pumped into the marsh or Pond A, upon approval of EPA.

B. Flood water will be sampled by HLA and analyzed for the wastewater effluent criteria for the Bailey site. If concentrations of constituents exceed the effluent criteria, the water will be pumped to the holding tank for treatment and discharge. If concentrations of constituents are below the effluent criteria, the water will be pumped into the marsh or Pond A.

Reviewed by
M.M.
1/17/94
no comments
issued to
EPA.
None requested.

STABILIZATION WORK PLAN

Bailey Superfund Site
Orange County, Texas

Submitted by
Chemical Waste Management
100 North Glenborough, Suite 500
Houston, Texas 77067

January 7, 1994

TABLE OF CONTENTS

See Cercla treatability Guidance for Letterkenny

1.0 INTRODUCTION

This Stabilization Work Plan has been prepared to satisfy the requirements of Section 02242 (Waste Stabilization) of the Bailey Site Remediation project specifications for the Area East of Pond A (east waste area) . Specifically, this document describes the following:

Mention the ROD Bench Studies Results to represent areas How does this represent worst case

- the waste stabilization method to be utilized,
- admixture mixing and monitoring,
- rate of advancement,
- percent overlap,
- admixture required to meet the performance requirements,
- equipment to be used,
- quality control,
- proposed method(s) of reworking areas which fail to meet the performance standard,
- the storage and regulation of admixtures, and
- the field demonstration program.

The mixing technique described herein is currently being performed at the site on a less than full scale production basis. Work currently being performed is considered part of the field demonstration program and is being performed to aid in expediting the work described herein.

2.0 WASTE STABILIZATION METHOD

2.1 General

The proposed stabilization method for use at the east waste area will consist of an inject and mix system (in-situ stabilization). This system will use "Piranha" rotary mixing head equipment to achieve thorough mixing and stabilization of the site wastes. Prior to mixing, a hydraulic excavator will be used to break up or loosen waste areas to augment mixing/stabilization.

Two Sample Areas, Nos. 2 and 7, are located within the east waste area which consists of a total of six Active Areas. Sampling Areas have previously been identified through remedial investigative work based on waste constituents present. Additionally, wastes which were previously removed from Sample Area 3 have been relocated to the east waste area.

Contractor sampling and monitoring activities will be conducted in compliance with contract specifications/plans and are discussed further in the following sections of this work plan.

2.2 Stabilization System(s) Description

need flowchart
How this fits into project + performance goals flowchart
scaleup considerations

2.2.1 General

Individual wastes areas will be prepared for stabilization using a hydraulic excavator to loosen the material and to remove any large debris for subsequent sizing and ultimate replacement into the stabilized waste. In-situ stabilization will be conducted using the Piranha system which consists of a twin rotary mixing head mounted on a modified hydraulic excavator. The mixing head is equipped with a 4-inch dia. injection line for delivery of stabilization reagents/admixtures. A 2-inch dia. line will also be fabricated and mounted for delivery of water to lubricate the mixer and to aid in providing a uniform mixture of waste materials (sludge and soils). This configuration will be typical for each individual Piranha.

Waste stabilization will be accomplished through the mixing action of the head which is raked through the waste while admixtures are pneumatically injected from silos or pneumatic trucks. Water is conveyed using conventional pumping equipment. The rate at which admixtures/water are added will be carefully controlled and monitored following the procedures outlined in Section 3.0 of this work plan.

Lateral and vertical extent of stabilization will be predetermined and staked out prior to mixing operations. Complete coverage of an active area to be treated will be accomplished by overlapping laterally at least one foot into adjacent areas. Vertical overlap or tie-in to bottom soils will be based on the Waste Stabilization Plan (East Levee), sheet no. 19 of 38, marked "issued for construction".

2.2.2 Stabilization Procedure

The proposed stabilization procedure is as follows:

- Determine the size of the stabilization grid and establish a grid pattern over the area using proper survey control. A grid is a small stabilization area within an active area;

- Water that is ponded or standing within waste areas which will not be used during the stabilization process will be pump off and kept to a minimum using conventional pumping equipment;

- Using a hydraulic excavator, prepare the entire area for stabilization by loosening waste materials and removing large debris. Stage debris outside of the waste area for subsequent sizing and ultimate replacement into the stabilized mass;

- Connect the Piranha to admixture and water conveyance equipment and assure distribution of reagent and water at the mixing head;

- Starting in the bottom of the grid at a level prescribed in the Waste Stabilization Plan, begin stabilization by raking the mixing head back and forth and up and down through the waste to assure thorough mixing. Stabilize from bottom to top in thirds (i.e., bottom third, middle third and top third) and overlap laterally at least one foot into surrounding stabilized areas. The reagent (cement) will be proportionally added to the waste in thirds.

- After the entire amount of reagent/admixture is added to the waste, continue mixing efforts until a uniform consistency is reached within the stabilized material with minimal air voids. Optimum admixture ratios, mixing time and mixture consistency will be established during the field demonstration in a manner which is repeatable in production;

- Remove stabilization equipment and advance to the next waste area. Repeat the above process. Document admixture ratios, start/stop times, and other pertinent information on the Record of Stabilization logsheet (Appendix B); and

- Allow stabilized materials approximately one to two days to cure prior to collecting construction control samples. Follow sampling procedures specified in section 8.0 and/or those established during field demonstration and review testing results to verify/modify treatment.
- Areas that fail to meet the stabilization performance criteria will be evaluated on a case-by-case basis and will be reworked following a method approved by HLA/BSSC and EPA, as addressed in Section 9.0.

3.0 ADMIXTURE MIXING AND MONITORING

3.1 General

Section 11.0 discusses the proposed admixture ratios that will be applied to designated waste areas during the field demonstration program. As discussed above, admixtures will be injected and mixed in-situ during stabilization using the Piranha process. Admixture injection will be monitored visually and metered in the field to achieve uniform distribution and to provide desired mixture consistency.

3.2 Mixing/Monitoring Procedure

Admixture mixing will be monitored and controlled to ensure a repeatable stabilization process. Admixture injection rates will be subject to actual mixing conditions which may vary from expected conditions however, they will be controlled by physically applying a known weight of reagent to a calculated weight of waste which is determined by the measured volume and in-place density of waste. Observations will be made of mixture uniformity and consistency and the mixing process will be monitored for thoroughness. Admixture weights/volumes will be determined and recorded prior to stabilization. Dry reagent weights will be determined using certified weigh scales. Injected water will be monitored using flow meters or by gauging the amount pumped from a storage container. The procedure for admixture mixing and monitoring is as follows:

- Admixture ratios will be determined on a total weight-to-weight basis: dry reagent to total weight of waste material to be stabilized. Calculate the grid size based on total weight of dry reagent to total weight of waste to be stabilized and convert to a reagent weight/waste volume ratio. The total weight of waste is determined from its in-place density taken from the Bailey Stabilization Evaluation Report. Grids will generally be rectangular in shape. The narrow dimension will be established to minimize "over reaching" of the excavator which could potentially affect depth of stabilization limit measurements. Acceptable reaches for the equipment will be determined during the field demonstration program and adhered to during production. Grid depth will have been previously determined during waste/soil interface studies;

Air monitoring

- Monitor injection rate of dry reagent and water using process in-line meters/gauges to ensure uniform dispersion of admixture within the waste area during mixing; and

- Record total amounts of admixture and water used on the Record of Stabilization logsheet.

need calculations on area volumes & cement & water volume mixing time per grid + moisture content bulking

air monitoring + criteria

Stabilization process control will be accomplished by pneumatically "blowing" a known weight of reagent from a standard bulk cement tanker truck into a previously surveyed grid area of known waste volume (and calculated total weight). Each grid area or "grid" to be stabilized will be layed out by a survey crew. Grid depths will be determined using depths taken from the Bailey Waste Stabilization Plan. Horizontal dimensions will be layed out and adjusted based on the total weight of reagent to be used for a given grid to yield a waste volume of approximately 110 cubic yards. A typical cement tank truck will approximately have a total of 26 tons of still must measure

reagent as certified by weigh scales. The application of 26 tons of cement to 110 cubic yards of waste will yield an application rate of approximately 22.7 % admixture ratio.

Application of reagent and water during the mixing process will be controlled in the following manner.

- Tanker truck air pressure and injection line pressure will be monitored using pressure gauges to ensure a continuous flow of reagent to the Piranha mixing head. Obstructions in the flow, if any, will be detected through the monitoring of these gauges as indicated by a sudden increase in pressure. Reagent flow will be controlled at the tanker truck using control valves.

- The application of water will be controlled using an in line valve and will be monitored using a flow meter.

- The tanker truck consists of three compartments (pods) of equal size which contain approximately equal amounts of reagent. This configuration allows the reagent to be applied in proportion to the volume of waste in a given grid (i.e. one pod is used per third of waste).

DQO's and test method evaluation

4.0 RATE / SEQUENCE OF ADVANCEMENT

maybe technology cannot be used

The following goal has been set for rate of advancement during field demonstration and full-scale production:

EPA central repository for treatability studies

- Estimated Stabilization Rate: 350 cubic yards of waste per stabilization system per work day.

Waste stabilization will begin in the southern portion of the east waste area (Active Area 1) and will advance to the north (Active Area 6) generally working two adjacent active areas simultaneously next to the east perimeter dike. Once stabilization is complete along this "inside strip" operation will commence on the outside or west side of the east waste area advancing identically from south to north. The remaining mid portion of the waste area will be stabilized last, again, working south to north. No more that two active areas will be worked at the same time unless permitted by the Engineer.

In order to alleviate any concerns of a potential dike failure which may be caused by stabilization activities, grids of approximately 15 ft. x 15 ft. will be worked in a "staggered" sequence along the toe of the dike. This approach will prevent a large waste area from being worked at any one time, decreasing the possibility of a dike failure.

5.0 SOLIDIFICATION OVERLAP

Each grid area will overlap into underlying clay soils and adjacent stabilized waste areas. As a minimum, stabilization will proceed vertically to the required depths shown on the Waste Stabilization Plan (East Levee), Sheet No. 19 of 38, marked issued for construction and laterally one foot into adjacent areas. Vertical overlap will be gauged and surveyed in from graduations marked on the Piranha boom. Lateral overlap will be measured from established grid lines using a tape measure. Overlap dimensions will be recorded on the Record of Stabilization logsheet.

6.0 ADMIXTURE REQUIREMENTS

Waste stabilization will be performed using some or all of the following reagents/admixtures.

out of mpliance

- Portland Cement (Type I/II): conforming with ASTM C150 and standard specifications for Type II cement;
- Bentonite: powdered sodium montmorillonite (commercial source); and
- Site Water: water ponded or pooled on site.

Optimal admixture ratios necessary to achieve stabilization performance criteria will be determined based on field conditions encountered during the field demonstration. The demonstration program will include evaluation at least three (3) admixture ratios (Section 11.0).

The following major equipment will be utilized to perform stabilization activities described in this work plan:

Equipment Description	Make & Model	Equipment Use
(2) Piranha Mixing Heads	Mitsui MT-1000A	Waste Stabilization
Trackhoe	CAT 325L	For mounting of Piranha
Trackhoe	Kamotsu 220	same
ATV Drilling Rig	"Deep Rock"	Sample Collection

Product literature for the piranhas is included in Appendix A. The total number of piranha systems (i.e., mixing head and trackhoe) may vary from the number listed above to meet production schedules.

8.0 QUALITY CONTROL

8.1 General

Construction quality assurance/quality control will be maintained during stabilization efforts by accomplishing the primary objectives set forth below:

- Providing an analysis reporting system designed to produce defensible and accurate data;
- Providing a traceable documentation system for field and laboratory activities including calibration of required equipment and apparatus;
- Developing an on-going consruction QC inspection program to ensure quality materials and workmanship; and

- Developing and maintaining a qualified staff with emphasis on quality assurance/quality control.

8.2 Construction QC Organization and Responsibilities

This section provides the contractor's organization including CWM personnel and subcontractors with a discussion of quality control responsibilities. The project QA/QC management team reports separately from project operations management. During waste stabilization activities the contractor's QC organization will be as follows:

Quality Control Manager(QCM): Mr. John W. Patin will be the designated QCM for the stabilization contractor. He is based out of the divisional office in Houston, Texas, and has prepared this work plan. He will monitor stabilization activities for compliance with contract specifications and this plan and aid in its implementation. Mr. Patin will participate in the field demonstration program described in section 11.0.

QC Officer/Sampling Technician(QCO): A qualified person will be the designated QCO for the stabilization project. He will report directly to the QCM and is responsible for the overall QC associated with stabilization activities and for overseeing the collection and transference of samples to the testing facility. He is also responsible for maintaining field documentation and tracking sampling and testing data in coordination with the selected testing firm's project manager.

8.2.1 Role of the Testing Firm(s)

Southwest Laboratories, Inc. out of Beaumont, Texas will be employed by CWM to perform independent testing for construction control purposed during the field demonstration and on-going stabilization. They are responsible for testing samples, maintaining adequate laboratory quality control as specified by testing method(s) and for reporting test data.

CWM will employ an independent firm to perform field sample collection. One firm has been selected and two alternates are proposed:

- Selected Firm: Scott Environmental Services, Inc. (SCSI); Houston, Texas
- Alternates: Layne Environmental-Houston, Texas; and Jones & Neuse-Nederland, Texas

need another checklist

The field sampling firms listed above are responsible for sample collection in accordance with contract specifications and protocols set forth herein. They are also responsible for field documentation in accordance with this work plan. Sample preservation, curing, custody and transference to the testing lab will be performed by CWM QC personnel.

8.3 Field Sampling Documentation

Field documentation is a vital aspect of the field sampling activities. The field documentation system provides the means to identify, track, and monitor each individual sample from the point of collection through final reporting. All field documentation will be completed using indelible ink.

8.3.1 Sample Numbers

A site-specific sample numbering system will used for the project which will contains a project designator, sample matrix code, and a sequential numerical designator. The general format will be as follows:

BSS#-AA#G#-SS

The first four characters (BSS7: Bailey Superfund Site, Sample Area 7) is the project designator for all samples collected during stabilization indicated by Sample Area. The second set of characters provide a reference to the Active Area and Grid Number.

The last two-character designation of the sample numbering system is numbered sequentially for each sample collected under a specific sample area and grid number. For instance, if a total of 10 samples are collected from Sample Area 7, Active Area 1, and Grid Number 2, the sequential designators will range from 01 to 10 (BSS7-AA1-G2-01 to 10).

Identification of type and location of all field samples and QA samples (including Engineer's samples) collected will be noted in the field log book to assure correlation of samples.

8.3.2 Field Log Book

A bound log book will be maintained by the sampling team to provide a daily record of significant events, observations, and measurements taken during the field sampling activities.

The field log book is intended to provide sufficient data and observations to enable the field team to reconstruct events that occur during the project. Error in entry or mistakes will be crossed out with a single line and initialed. The following information will be recorded as a minimum:

- Date and 24-hour clock (military type) time of collection;
- Weather conditions;
- Names of sampling team;
- The site number and name;
- Location of sampling point;
- Sample identification code;
- Type of sample;
- Sampling method used (reference to applicable specification or work plan procedure);
- Any field measurement taken (sample depth, etc.);
- Field observations;
- References such as maps or photographs of the sampling site;
- Any procedural steps taken that deviate from those in the contract specifications or this work plan.

not enough

8.4 Treatment Operations Documentation

To ensure that complete and defensible operating records are produced for stabilization activities and to ensure that sampling and testing data support the verification for treatment the following documentation and/or forms will be maintained on site.

- Documentation and results of the Field Demonstration Program;
- Records of Stabilization (Appendix B);
- Daily Quality Control Reports (Appendix B);
- Reagent/admixture quality and traceability (i.e., material certifications);
- Weigh Scale Tickets; and
- Results of the Waste/Soil Interface Study

among not shown

see checklist

Data which may affect the efficiency of treatment operations or attainment of applicable treatment standards will be documented. The information will include but not be limited to reagent weights/volumes, densities, waste weights/volumes, results of process control activities, stabilization methods, length of stabilization process, samples collected, test results, observations, comments, etc. This information/documentation will be made available to the Engineer or others upon request.

needs to be on checklist

8.5 Construction Quality Control Inspection Program

Construction Quality Control will consist of a set of inspections performed on a regular basis and throughout stabilization activities. These inspections will consist of preparatory, initial, and follow-ups as well as completion. Appropriate inspection forms have been included in Appendix B.

8.5.1 Preparatory Inspection

Preparatory inspections will be performed prior to beginning work in Active Areas. These will include but not be limited to the following:

- Review of the contract and work plan requirements;
- A check to assure that all materials and/or equipment are on hand and have been tested, submitted, and approved;
- A check to assure that provisions have been made to do required control testing.
- Examination of the work area to ascertain that all preliminary work has been completed;
- A physical examination of materials, equipment, and sample work to assure that they conform to submittal data and/or specifications.

The Engineer will be notified at least 24 hours in advance of the preparatory inspection and prior to commencement of the work. CWM will instruct each contributing worker as to the acceptable level of workmanship required in order to meet the specifications.

8.5.2 Initial Inspection

The Initial Inspection will be performed as soon as a representative portion of waste area stabilization has been accomplished, and will include examination of the quality of workmanship and materials, a review of control testing for compliance with contract requirements, and inspection for omissions and dimensional requirements.

The Engineer will be notified at least 24 hours in advance of the initial inspection, and such inspection will be made a matter of record in the contractor's QC documentation.

8.5.3 Follow-up Inspections

Follow-up Inspections will be performed regularly to assure continuing compliance with contract requirements, including control testing, until substantial completion of that particular segment of work. Such inspections will be made a matter of record in the contractor's QC documentation.

8.5.4 Completion Inspection

CWM will notify the Engineer at times when major portions of the stabi'ization work are deemed complete to coordinate scheduling the QC verification testing in accoɪdance with the technical specifications. Once the QC verification testing is completed, the results will be provided to CWM, alon with any deficiencies noted that will require correcting. When the deficiencies have been corrected by CWM and the completed work is ready for retesting, CWM will notify the Engineer.

8.5.6 Corrective Action

The quality control staff will assure that all work is completed in accordance with the contract specifications and this work plan. Should work be determined to be incomplete, CWM will remedy all deficiencies and request retesting through HLA.

8.6 Daily QC Reporting

Daily QC reporting will generally consist of two log forms(included in Appendix B): 1) the Record of Stabilization Form and 2) the Daily QC Form. Both forms should be transmitted to the Engineer within 24 hours of completing the previous day's work. Information required on the record of stabilization form has been previously discussed. Provided below is discussion of daily QC reporting requirements.

The Daily QC Report, as a minimum will contain the following:

- Location of work (sample area, active area, grid number);
- Weather information;
- Work performed (in direct relation to stabilization performed and sampling events);
- Specific inspections performed and results;
- Problems identified (e.s. trouble collecting particular samples, stabilization equipment

difficulties, etc);

- Verbal or written instructions from the Engineer pertaining to stabilization and sampling activities;
- Samples collected, type of tests performed, personnel involved and results of tests;
- Calibration documentation, if any (for all field meters/instruments used in sampling and analysis); and
- Signed certification that information contained in the report is true to the best of the QC representative's knowledge of daily events.

8.7 Construction Control Sampling and Testing

8.7.1 Sampling Strategy and Sample Curing

This section provides requirements for sampling and testing which will be conducted to verify waste treatment and assure process control. The sampling strategy (i.e., number of samples, locations/depths, etc.) is summarized below. More samples will be taken during the field demonstration than full-scale production to ensure control of the stabilization process.

Stabilization Phase	Proposed Number of Samples
Field Demonstration	Two Borings/Grid (continuous sampling) and Three (3) Molded Composite Samples*/Grid
Full-Scale Production	Two Borings/Active Area (3 samples per boring) and Three (3) Molded Composite Samples*/Active Area

* Molded samples (specimens) are optional and will be used to support construction control.

Samples ,as proposed above, will undergo laboratory testing after curing at least 7 days for unconfined compressive strength (ASTM D2166), and falling head permeability (ASTM D5084).

From each set of samples taken, both cored and molded, sufficient numbers will be archived in the event that a 28-day test is necessary.

The information summarized above is the basis for the proposed strategy to be followed in the field. As full-scale production is approached and is subsequently on-going CWM may opt to continue the strategy associated with field demonstration, which requires more sample coverage per unit area, until a level of confidence is reached that allows the sample coverage to be reduced.

Sample preservation and curing will be conducted under field conditions by CWM QC personnel. A small subsurface trench lined with polyethylene sheeting will be installed in a well drained location within the east waste area. As samples are collected they will be sealed in plastic bags or wrapped with sheeting and placed in the trench to cure. The trench sheeting will be folded over on itself to protect samples from adverse weather and a piece of plywood will be placed on top. Laboratory testing will not be allowed prior to 7 days from sample collection.

8.7.2 Waste Stabilization Performance Criteria

The following performance criteria applies for all stabilized waste materials.

Same as lab data can never be achieved
Can methods be changed or surrogates be used

- The stabilized waste must exhibit a minimum unconfined compressive strength of 25 psi when tested in accordance with ASTM D2166;
- Permeability must equal to or less than 1×10^{-6} cm/sec when tested in accordance with ASTM D5084 (Falling Head Methods B or C); and
- The vertical extent of the stabilized waste at each established final grid intersection will must correspond, at a minimum, to the elevations required by the final Waste Stabilization Plan prepared by the Engineer.

Performance criteria stated for physical properties of the stabilized waste (determined by lab testing) will be verified through field sampling strategies mentioned above. The interim vertical extent of stabilized waste will be measured and confirmed during field demonstration and full-scale production from graduations marked on the Piranha boom.

8.7.3 Sample Collection Procedure: Core Sampling

An independent geotechnical testing company will be contracted by CWM to collect in-situ samples of stabilized waste during field demonstration and full-scale production to ensure that performance criteria are met. This procedure outlines the requirements for collecting samples using a split-barrel sampler and/or thin-wall tube in accordance with a modified ASTM Method (ASTM D 1587) which is written for collecting samples using a hydraulically pushed thin-walled tube. Stabilized waste will be allowed to cure sufficiently to allow drilling equipment obtain samples. Drilling equipment will be used to collect samples using a split-barrel sampler equipped with a liner or inner sleeve.. The ASTM procedure is highlighted below and presented in full in Appendix C.

- Set up drilling and sampling equipment over the selection sampling location;
- Clean out the borehole to sampling elevation using a method that will ensure the material to be sampled is not disturbed;
- Place the sampler so that its bottom rests on the bottom of the hole (top of the sampling interval) and advance the sampler using hydraulics without rotation by a continuous relatively rapid motion;
- Withdraw the sampler from the stabilized material as carefully as possible to minimize sample disturbance;
- Upon removal of the sampler, remove the inner sleeve containing the sample, carve off any protruding material and cap both ends (when using a split-barrel sampler) or extrude the core on to a PVC catcher, place in a clear plastic tube, cap and seal both ends; and
- Immediately affix labels or apply markings containing the appropriate sampling and testing information and prepare for curing as described in paragraph 8.7.1.

If the consistency of the stabilized material is such that it cannot be sampled using hydraulics, it will be necessary to use other means for advancing the sampler such as driving the sampler using a hammer drop system in accordance with ASTM D1586 (Appendix C).

Sampling/boring locations should be randomly selected. During the field demonstration, borings will be sampled continuously. During full-scale production, only 3 samples will be collected from each boring obtained from top, middle and bottom thirds of the stabilized mass.

8.7.4 Optional Sample Collection Procedure: Molded Composite Sampling

In conjunction with core sampling, CWM may opt to collect composite samples of the stabilized material and to prepare molds of these samples for construction control tests. These samples will be prepared much like concrete samples using a modification of ASTM C31 (Appendix C). Results from molded samples (specimens) will be compared with core sample results to assess whether this procedure is a viable alternative for construction control. The proposed sampling procedure is outlined below.

- Upon completion of waste stabilization within a given grid area, collect a representative sample of the mix from the Piranha head using a clean scoop, spoon, or clean gloved hand;
- Material clinging to the Piranha head should be representative of the stabilized column prior to sample collection and molding. Nominal 2-inch or 3-inch I.D. by 6-inch cylindrical molds will be used;
- Place the mix in the mold in three layers of approximately equal volume. Rod each layer with a prewet rod or dowel or fingertip(s) for approximately 10 strokes. Rod the bottom layer throughout its depth;
- Distribute the strokes uniformly over the cross section of the mold and for each upper layer allow rod to penetrate about 1/4 to 1/2 inches into the underlying layer;
- Be sure to rod each layer in such a manner that eliminates/minimizes air voids. When placing the final layer, avoid overfilling by more than 1/4 inch and screed

off excess material so that it is flush with the top of the mold; and

- Immediately affix labels or apply markings containing the appropriate sampling and testing information and prepare for curing as described in paragraph 8.7.1. Ensure that specimens are standing upright during the curing process.

8.7.5 Assessing Vertical Limit of Stabilization

Stabilization in all waste areas will extend to depths shown in the Waste Stabilization Plan (East Levee), Sheet No/9 of 38, marked "issued for construction". During stabilization activities, the vertical limit of stabilization will be assessed from depth measurements taken from graduations marked on the Piranha boom. Actual limits, other than those determined ultimately by the Engineer, will be periodically confirmed using a drilling rig and core sampling equipment (procedure 8.7.3).

8.8 SAMPLE CUSTODY AND TRANSFER PROCEDURES

Sample custody is maintained by a standard Chain-of-Custody Record (see Appendix B). Once this record is completed, it becomes an accountable document and must be maintained in the project file. The following information will be supplied in the indicated spaces in detail.

- The project number.
- The project name.
- The signature of all samplers.
- The sampling station number.
- The date and time of sample collection.

- Core or molded sample designation.

- Sample Identification Number as listed on sample label (under column labelled "Station Location").

- The total number of sample containers.

- Any necessary remarks.

- Documented transfer of the samples.

The original signature copy and an additional copy of the Chain-of-Custody Record will be enclosed in a plastic bag and submitted to the testing facility. A copy of all Chain-of-Custody Records will be retained on site in the CWM project file.

8.8.1 Field Custody Procedures

CWM will adhere to the following custody procedures:

- The field sampler is personally responsible for the care and custody of the samples collected until they are properly and formally transferred to another person or facility;

- Sample labels will be completed for each sample, using waterproof, non-erasable ink; and

- A Chain-of-Custody Record will be completed for all samples collected.

9.0 PROCEDURES FOR REWORKING AREAS

Treated material which fails to meet the waste stabilization performance standards will have to be reworked to meet the requirements. Failed areas will be evaluated on a case-by-case basis to determine the method for reworking the area, which will require approval by the Engineer/BSSC and EPA.

The following procedure is one possible method that may be utilized to rework areas not meeting the performance specification:

- Identify the grid which fails to meet the specification based on review of the final test results;
- Remove any temporary cover which may have been placed over the solidified waste to minimize water treatment requirements and stockpile adjacent to the grid being reworked;
- Break up the solidified material using a hydraulic excavator with the appropriate bucket;
- Process (i.e. grind) the loosened material using the Piranha prior to adding additional reagent;
- Retest the material per the quality control requirements established herein; and
- Repeat/modify the process if necessary.

10.0 STORAGE AND REGULATION OF ADMIXTURES

Reagents delivered to the site generally will be pneumatically pumped straight to the mixing equipment and will not be stored on site. However, in some instances, reagents will be stored on site using a silo commonly referred to as a "pig".

Suppliers of stabilization reagents to the job site will submit required material certification paperwork for receipt acceptance. This documentation will remain on site throughout the project and then be turned over to the client for permanent property records.

11.0 FIELD DEMONSTRATION PROGRAM

CWM will demonstrate the performance of the Piranha waste stabilization process at the east waste area before proceeding with full-scale production. This field demonstration program will be conducted in Sample Area 7/Active Area 1 as depicted on the construction plans. Field demonstration for Sample Areas 4 and 9 (North Channel Area) will be conducted at a later date under direction from a separate stabilization work plan.

Within Active Area 1, at least five grids (grid numbers 1-5) are proposed for stabilization demonstration using admixture ratios given by the table below.

Grid Number	Reagent	Reagent Percentage (by weight)
1	Cement	15%
2	Cement	20%
3	Cement	30%
4	Cement Bentonite	20% 5%
5	Cement Bentonite	25% 5%

Grids designated 1 through 3 listed will be demonstrated during the field demonstration. If none of these admixture ratios (grids 1-3) are demonstrated to be effective in meeting treatment standards, admixtures involving bentonite and cement may be evaluated.

Duplicating the order by which each admixture ratio is listed above is not mandatory, however the associated identification between grid numbers, ratios and reagents should be maintained.

Prior to beginning any stabilization, the demonstration area(s) will have been prepared: 1) to provide access for delivery of bulk materials; 2) to provide adequate working area for stabilization equipment; and 3) to provide sufficient laydown area for all necessary appurtenances and other equipment.

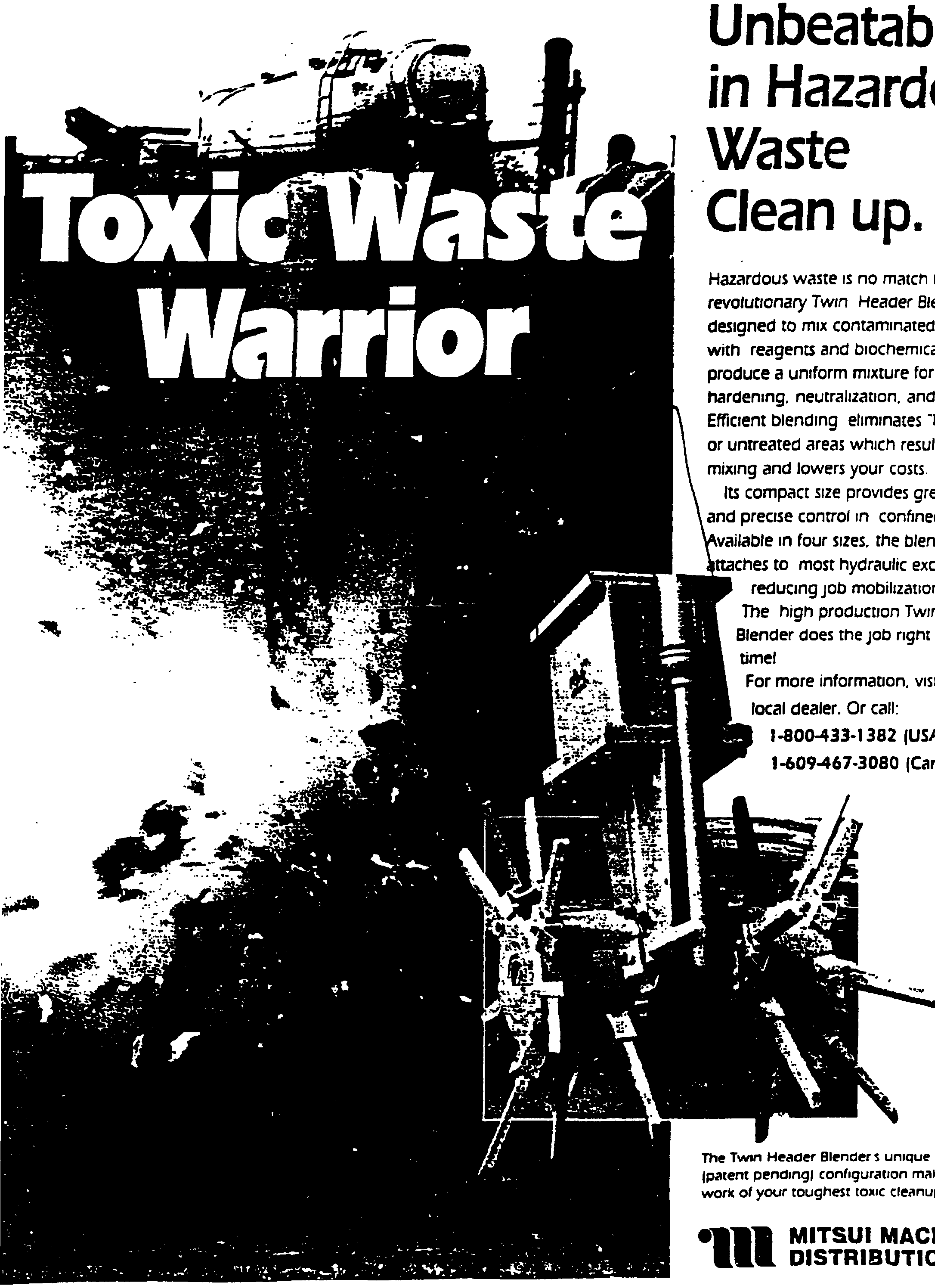
Applicable contract specifications and procedures specified herein, such as stabilization procedures, sampling protocols, overlap and rates of advancement, etc. will be followed during the field demonstration.

A selected waste area that has been stabilized previously using the MecTool and that has not met the treatment standards will also be included in this program to assess the method for reworking failed areas as described in Section 9.0. Test areas proposed for reworking during this program will be selected in the field and will receive at least 5% admixture by weight of reagent for re-stabilization. Test area size will be determined according to procedures outlined in Section 3.0.

This work plan has been developed to provide minimal requirements for stabilization and construction control testing and documentation during the field demonstration and full-scale production. It is intended to be a "living" document which provides flexibility for field operations under existing and foreseen field conditions. In the event that conditions change and modifications to procedures set forth herein are required, this plan will be updated/revised to incorporate changes.

APPENDIX A

Stabilization Equipment Product Literature



Toxic Waste Warrior

Unbeatable in Hazardous Waste Clean up.

Hazardous waste is no match for the *revolutionary Twin Header Blender* It is designed to mix contaminated materials with reagents and biochemicals to produce a uniform mixture for quick hardening, neutralization, and removal Efficient blending eliminates "hot spots" or untreated areas which results in less mixing and lowers your costs.

Its compact size provides great visibility and precise control in confined areas. Available in four sizes, the blender attaches to most hydraulic excavators, reducing job mobilization costs. The high production Twin Header Blender does the job right the first time!

For more information, visit your local dealer. Or call:

1-800-433-1382 (USA) or
1-609-467-3080 (Canada).

The Twin Header Blender's unique (patent pending) configuration makes short work of your toughest toxic cleanup jobs.

MITSUI MACHINERY DISTRIBUTION, INC.

Beat the Competition to the Crunch

The multi-purpose Twin Header puts you on top. Every job, every time.

Conventional, it's not. It's unique. It's so innovative, some even call it revolutionary! The Twin Header is easily attached to any excavator or backhoe loader. Since it is available with different teeth variations, it delivers more work in less time than any other attachment on the market.

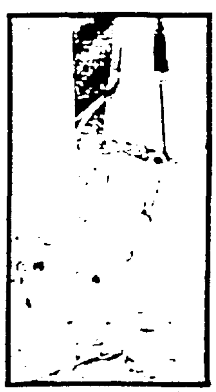
The Twin Header has been used worldwide for:

- Controlled concrete demolition
- Rock excavation
- Asphalt removal
- Underwater grinding
- Frost cutting
- Tunneling
- Blending
- Stump removal

Make Twin Header part of your equipment spread . . . you'll finish the job sooner, and the added bonus will show up on your bottom line numbers.

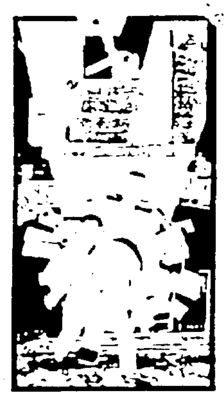
Available in five job-matched sizes, the Mitsui Miike Twin Header will give you the competitive edge in the '90s.

For more information, visit your local dealer or call 609-467-3080.



Stumping

Rock Grinding



Hazardous Waste blending

Concrete Scaling

MITSUI MACHINERY DISTRIBUTION, INC.

P.O. Box 429, Bridgeport, N.J. 08014

Checklist
date time weather witness
This is inadequate
need table

visual observations
bulking
too wet
flowing
clay
good mix

area measurements
Waste area
grid size
mixing time
reagent weight
moisture, ponded water content
mixing depth percent time
field observations
water volume added
trucks
reagent weight

backhoe, premixing equipment time areas.
Stakeout measurements engineers sketch
bulking
waste volume
depth
grid point
start mixing
end mixing
problems : deficiencies

visible dust
odors
air mon data
corrective actions
air monit

Test data sheet
field reports

Tester
Date
Time
Sample
preservation
witness
etc.

APPENDIX B

Quality Control Inspection Forms

(EXAMPLE)

RECORD OF STABILIZATION

Chemical Waste Management Remedial Services

BAILEY SUPERFUND SITE
Orange County, Texas

DATE:_________________SAMPLE AREA NO:______ ACTIVE AREA NO.:______ GRID NUMBER:_______
GRID DIMENSIONS (LxWxD):__________________

REAGENT TYPE(S): ______________________
REAGENT(S) LOT OR BATCH NO:______________
TOTAL QTY OF WATER USED:______________(gal)

WASTE DENSITY:________________________tons/cubic yards
REAGENT QTY.:_______________tons WASTE VOLUME :__________________________cubic yards

WASTE QTY = WASTE VOL. (cy) x WASTE DENSITY (tons/cy) = _________________________tons

WASTE TO REAGENT RATIO = $\frac{\text{REAGENT QTYs}}{\text{WASTE QTY}}$ X 100 = _________________________%

PHYSICAL DESCRIPTION OF RAW WASTE:____

MIXING METHOD: _______________________ MIXING START TIME: __________ MIXING STOP TIME: ______________

PHYSICAL DESCRIPTION OF STABILIZED SOIL:____

SAMPLES COLLECTED? ________YES ________NO PARAMETERS TO BE ANALYZED:______________________

NUMBER OF SAMPLES:______SAMPLE ID NOS:____

CHAIN OF CUSTODY NO:______________ LAB REPORT NO: _________________

ANALYTICAL RESULTS (comment on pass or fail status):____________________________________

WEATHER CONDITIONS:____

STABILIZATION LIMITS (depth):________ WASTE/SOIL INTERFACE LIMIT(depth):_________

SUFFICIENT TIE-IN TO BOTTOM SOILS?___Y___N SUFFICIENT OVERLAP ACHIEVED?___Y___N

IF NOT, EXPLAIN CORRECTIVE ACTION____

PROBLEMS/DIFFICULTIES ENCOUNTERED:____

____

OTHER COMMENTS/REMARKS:____

____

OPERATOR PRINTED NAME:_______________________________SIGNATURE:____________________

PROJECT MANAGER PRINTED NAME:_________________________SIGNATURE:____________________

CQM DAILY
QC REPORT

DATE ________________

DAY

S	M	T	W	TH	F	S

CWM QCM____________
PROJECT ____________
JOB NO. ____________
CONTRACT NO.__________

WEATHER	SUNNY	CLEAR	OVERCAST	RAIN	SNOW
TEMP	0-32	32-50	50-70	70-85	85 UP
WIND	STILL	MOD	HIGH	REPORT NO.	
HUMIDITY	DRY	MOD	HUMID		

SUB-CONTRACTORS ON SITE:

EQUIPMENT ON SITE:

WORK PERFORMED (INCLUDING SAMPLING):

DAILY QUALITY CONTROL REPORT
(Page 2 of 2)

PROJECT:______________________________ REPORT NO:____________________
JOB NO.:______________________________ DATE:____________________

CHEMICAL DATA QUALITY CONTROL ACTIVITIES(INCLUDING FIELD SAMPLING AND CALIBRATIONS):
PPE LEVEL USED FOR SAMPLING ACTIVITIES:
PROBLEMS ENCOUNTERED/CORRECTIVE ACTION TAKEN:
SPECIAL NOTES:
ACTIVITIES PLANNED FOR TOMORROW:

CERTIFICATION: **I certify that the above report is complete and correct and that I, or my authorized representative, have inspected field sampling performed today by CWM and its subcontractors and have determined that all materials, equipment, and procedures are in strict compliance with this work plan and specifications except as may be noted above.**

____________________ CWM QC REPRESENTATIVE

INITIAL INSPECTION CHECKLIST

This form is applicable also for Follow-Up Inspections

CONTRACT NO.: ____________________ DATE: ______________

DESCRIPTION AND LOCATION OF WORK INSPECTED: ______________________

______________________________________ SPECS. SECTION ______

REFERENCE CONTRACT DRAWINGS: ______________________________

A. PERSONNEL PRESENT:

	NAME	POSITION	COMPANY
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

B. MATERIALS BEING USED ARE IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS. YES ________ NO __________

IF NOT, EXPLAIN: ______________________________

____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS. YES ________ NO ______________

IF NOT, EXPLAIN: ______________________________

____

D. WORKMANSHIP IS ACCEPTABLE. YES ________ NO _________

IF NOT, EXPLAIN: ______________________________

____

E. SAFETY VIOLATIONS AND CORRECTION ACTION TAKEN: ______________

____

____

QUALITY CONTROL REPRESENTATIVE

United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
Directive 9380.3-02FS
December 1989

EPA

TREATABILITY STUDIES UNDER CERCLA: AN OVERVIEW

Office of Emergency and Remedial Response
Hazardous Site Control Division OS-220
Quick Reference Fact Sheet

Section 121(b) of CERCLA mandates EPA to select remedies that "utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable" and to prefer remedial actions in which treatment "permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants as a principal element." Treatability studies provide data to support treatment technology selection and remedy implementation and should be performed as soon as it is evident that insufficient information is available to ensure the quality of the decision. Regional planning should factor in the time and resources required for these studies.

This fact sheet provides a synopsis of information to facilitate the planning and execution of treatability studies in support of the RI/FS and the RD/RA processes. Detailed information on designing and implementing treatability studies for the RI/FS process is provided in the "Guide for Conducting Treatability Studies under CERCLA," Interim Final, EPA 540/2-89/058, December 1989. A summary of Chapter 2 (Overview of Treatability Studies) is incorporated in this paper. The remainder of that document provides protocols for implementing the studies.

DEFINING TREATABILITY STUDIES

Treatability studies are laboratory or field tests designed to provide critical data needed to evaluate and, ultimately, to implement one or more treatment technologies. These studies generally involve characterizing untreated waste and evaluating the performance of the technology under different operating conditions. These results may be qualitative or quantitative, depending on the level of treatability testing. Factors that influence the type or level of testing needed include: phase of the project [e.g., remedial investigation/feasibility study (RI/FS) or remedial design/remedial action (RD/RA)], technology-specific factors, and site-specific factors.

- Treatability studies conducted during the RI/FS to support remedy selection are generally used to determine whether the technology can achieve the anticipated Record of Decision (ROD) goals and to provide information to support the nine evaluation criteria to the extent possible.
- Treatability studies to support remedy implementation during RD are generally used to verify that the technology can achieve the ROD goals, optimize design and operating conditions necessary to ensure performance, and improve cost estimates.

LEVEL OF TREATABILITY STUDIES

Treatability studies should be performed in a systematic fashion to ensure that the data generated can support the remedy evaluation and implementation process. A well-designed treatability study can significantly reduce the overall uncertainty associated with the decision, but cannot guarantee that the chosen alternative will be completely successful. Care must be exercised to ensure that the treatability study is representative of the treatment as it will be employed (e.g., sample is representative of waste to be treated) to minimize the uncertainty in the decision. The method presented below provides a resource-effective means for evaluating one or more technologies.

There are three levels or tiers of treatability studies: laboratory screening, bench-scale testing, and pilot-scale testing. Some or all of the levels may be needed on a case-by-case basis. The need for and the level of treatability testing required are management decisions in which the time and cost necessary to perform the testing are balanced against the risks inherent in the decision (e.g., selection of a treatment alternative). These decisions are based on the quantity and quality of data available and on other decision factors (e.g., State and Community acceptance of the remedy, new site data). The flow diagram for the tiered approach in Figure 1 traces the stepwise review of study data and the decision points and factors to be considered.

- Laboratory screening is the first level of testing. It is used to establish the validity of a technology to treat a waste. These studies are generally low cost (e.g., $10K-50K) and usually require hours to days to complete. They yield data that can be used as indicators of a technology's potential to meet performance goals and can identify operating standards for investigation during bench- or pilot-scale testing. They generate little, if any, design or cost data and generally are not used as the sole basis for selection of a remedy.

- Bench-scale testing is the second level of testing. It is used to identify the technology's performance on a waste-specific basis for an operable unit. These studies generally are of moderate cost (e.g., $50K-250K) and may require days to weeks to complete. They yield data that verify that the technology can meet expected cleanup goals and can provide information in support of the detailed analysis of the alternative (i.e., the nine evaluation criteria).

- Pilot-scale testing is the third level of testing. It is used to provide quantitative performance, cost, and design information for remediating an operable unit. This level of testing also can produce data required to optimize performance. These studies are of moderate to high cost (e.g., $250K-1,000K) and may require weeks to months to complete. They yield data that verify

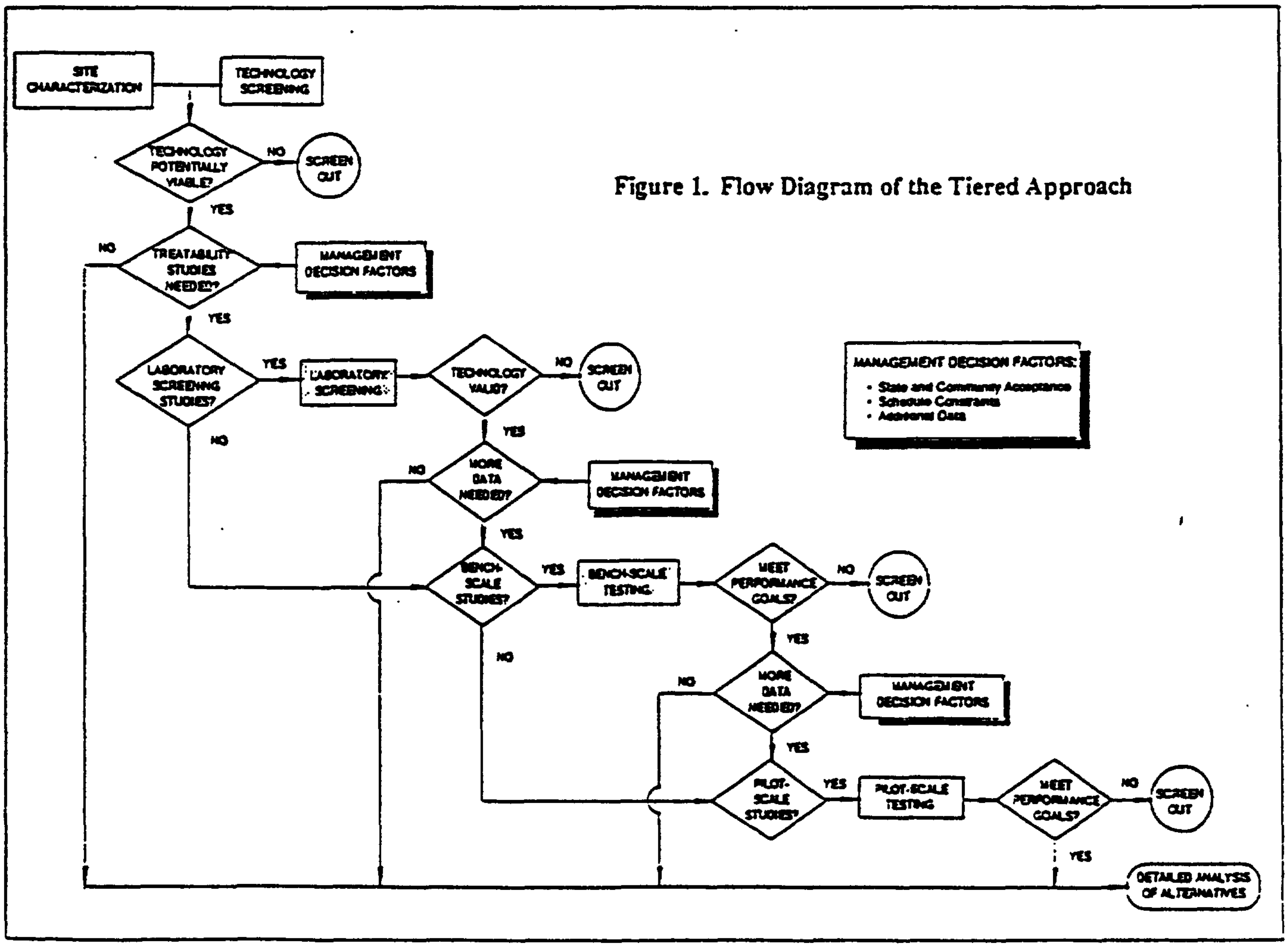


Figure 1. Flow Diagram of the Tiered Approach

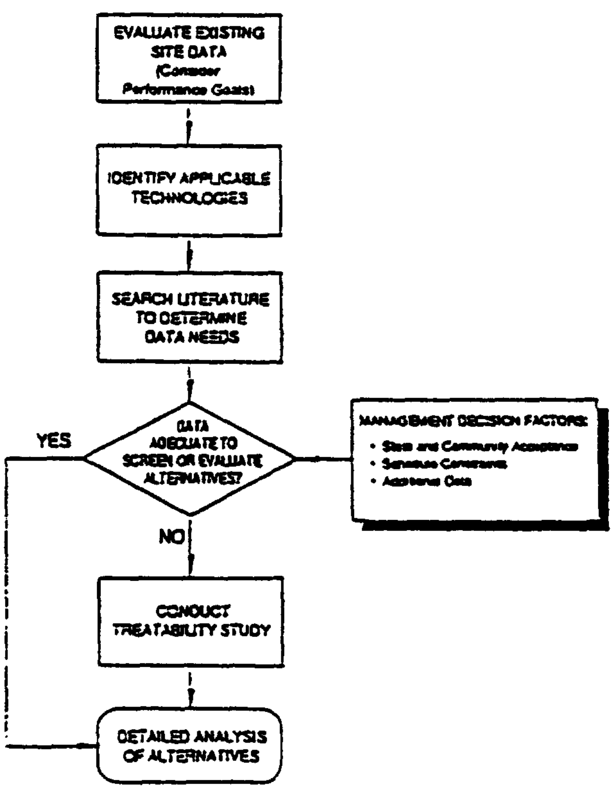
performance to a higher degree than the bench-scale and provide detailed design information. They are most often performed during the remedy implementation phase of a site cleanup, although this level may be appropriate to support the remedy evaluation of innovative technologies.

Technologies generally are evaluated first at the laboratory screening level and progress through the bench-scale to the pilot-scale testing level. A technology may enter, however, at whatever level is appropriate based on available data on the technology and site-specific factors. For example, a technology that has been studied extensively may not warrant laboratory screening to determine whether it has the potential to work. Rather, it may go directly to bench-scale testing to verify that performance standards can be met.

DETERMINING THE NEED FOR TREATABILITY STUDIES

Treatability studies for remedy evaluation and implementation represent good engineering practice. The determination of the need for and the appropriate level of a treatability study(ies) required is dependent on site-specific factors, the literature information available on the technology, and technical expert judgment. The latter two elements — the literature search and expert consultation — are critical factors in determining if adequate data are available or whether a treatability study is needed to provide those data. Figure 2 provides a decision tree for treatability studies in the RI/FS. Additional studies may not be needed if previous studies or actual implementation have encompassed essentially identical site conditions. The data and information on which this decision is based should be documented. Given the lack of full-scale experience with innovative technologies, pilot-scale testing will generally be necessary in support of remedy selection and implementation.

Figure 2. Decision Tree Showing When Treatability Studies Are Needed to Support the Evaluation and Selection of an Alternative



SUPERFUND PROCESS – TIMING OF TREATABILITY STUDIES

Treatability studies should be planned and implemented as soon as it is evident that insufficient information is available in the literature to support the decision necessary for remedy selection or implementation. Treatability testing of technologies may begin during the scoping phase, the initial phases of site characterization and technology screening, and continue through the RI/FS and into the RD/RA to support remedy implementation. Additional treatability studies of alternate technologies or treatment trains also may be needed later in the RI/FS process as other promising remedial alternatives are identified.

For many site types, initial data are available to identify potentially applicable technologies early during the scoping phase of the RI/FS for all or parts of the site. In those cases, the literature search, the planning, and the implementation of the treatability study can proceed. The planning of the studies should coincide with the scoping of the RI/FS to the extent practicable to ensure that data are gathered during the RI to support the technologies and associated treatability studies.

Similarly, treatability studies to support the remedy implementation also should be conducted as early in the RD as appropriate. As with the RI/FS treatability study, additional technology-specific site characterization data may be needed to aid in the design and implementation of the study.

TREATABILITY STUDY GOALS

Each level of treatability study requires appropriate performance goals. These goals should be specified before the test is conducted. The goals may need to be reassessed to determine appropriateness following testing performance as a result of new information (e.g., ARARs), treatment train considerations or other factors. Pre-ROD treatability study goals will usually be based on the anticipated performance standards to be established in the ROD. This is because cleanup criteria are not finalized until the ROD is signed due to continuing analyses and ARARs determinations. The treatability goals should consider the following factors independently or in combination:

- Levels that are protective of human health and the environment (e.g., contact, ingestion, leaching) if treated waste is left unmanaged or is managed;
- Levels that are in compliance with ARARs, including the land disposal restrictions;
- Levels that ensure a reduction of toxicity, mobility, or volume;
- Levels acceptable for delisting of the waste; and
- Levels set by the State or Region for another site with contaminated media with similar characteristics and contaminants.

Further, the program has as the treatment goal and expectation that treatment technologies and/or treatment trains generally achieve a 90 percent or greater reduction in the concentration or mobility of individual contaminants of concern. This goal complements the site-specific risk-based goals. There will be situations where reductions outside this range that achieve health-based or other site-specific remediation goals, may be appropriate. Treatment technologies should be designed and operated such that they achieve reductions beyond the target level indicated to ensure that the stated goals are achieved consistently.

Laboratory screening of treatability study goals allows for a go/no-go decision. For example, the goal may be a 50 percent reduction in mobility which would indicate the potential to achieve greater reduction (e.g., 90 percent) through additional refinement of the study. The achievement of this goal might indicate the advisability of expending additional resources on a bench-scale test to obtain a more definitive evaluation of the technology. Bench- and pilot-scale testing goals are those needed to select and/or implement the technology. For example, the bench-scale testing goal for solidification/stabilization could be to achieve a 90 percent or greater reduction in mobility of the principal constituents. In addition, the goals for the bench- or pilot-scale studies also may involve multiple waste treatment levels — the performance of which dictates the ultimate disposition of the waste (i.e., clean closure or landfill closure).

Post-ROD treatability study goals should reflect those performance standards specified in the ROD. They should also be achieved in the most resource-efficient manner.

ADMINISTRATIVE PLANNING

The planning process for treatability studies begins during the budget cycle in the year prior to the planned performance. At that time, the potential need for treatability studies and their cost is estimated to ensure adequate resources and to factor the study into the planning for the site (e.g., scheduling the RI/FS). In many cases, the RI/FS will not have been initiated at this time, and assumptions will need to be made. In view of the limited literature information that is currently available on technology performance, it is anticipated that one or more treatability studies may be necessary for most sites. *Funding for treatability studies is separate from RI/FS funding and is over and beyond the target of RI/FS cost of $750K.*

Planners need to take into consideration treatability studies to be performed by contractors, EPA, and other Federal Agencies (e.g., Corps of Engineers) to support the ROD and the RD/RA. Treatability study funds will be needed for Fund-lead sites and for selected Enforcement-lead sites if the Responsible Party (RP) is not performing the study. Funds also will be needed for oversight of the studies. Oversight of Fund-lead treatability studies will be allocated as part of the treatability study. Oversight of RP-lead treatability studies will be funded through the enforcement budget.

FUNDING

Treatability studies in support of the RI/FS or the RD/RA are funded from the "Other Remedial" account if they are Federally-funded. The amount of treatability study funding required is dependent on technology and site-specific factors. The section in this fact sheet entitled "Levels of Treatability Studies" provides a rough estimate of resources and time required to perform the studies. Resources required may vary greatly depending on site conditions and data needs.

In the event that treatability study funding requirements exceed planned treatability study allocations (either due to the costs of the studies or due to the need for studies which were not planned for), these studies should be funded from the Region's "Other Remedial" account or other Regional monies through the SCAP process. Regions should contact Tom Sheckells (OERR/OPM, FTS 382-2466) for clarifications.

All treatability studies, whether performed by a contractor or EPA, are funded out of the Regional SCAP account. Procurement Requests (PR) used to initiate work should have activity code "9" to ensure proper record keeping.

CERCLIS

Treatability studies are coded in CERCLIS under the event code "TS" that provides for separate event coding for each treatability study for a given site. This allows for multiple treatability studies with separate funding (e.g., Federal-, State-, or Responsible Party-lead treatability studies).

PERFORMANCE OF TREATABILITY STUDIES

Fund-lead treatability studies generally will be conducted through the REM or ARCS contractors or their sub-contractors or contractors working for States. A list of vendors that have expressed interest in performing treatability studies has been compiled in the "Inventory of Treatability Study Vendors." A preliminary draft copy is scheduled for distribution in January 1990. Companies on this list should be notified of requests for proposals (RFPs) for treatability studies in accordance with the Federal Acquisition Regulations.

EPA and other Federal Agencies such as the Bureau of Mines also may perform select treatability studies on a case-by-case basis. Again, the funding of these activities is through the Regional SCAP allocations.

Enforcement-lead treatability studies generally will be accomplished through the RP contractor. There may be exceptions to this where the complexity of the site requires alternative options (e.g., State- or Federal-lead treatability studies for all or part of a site). The planning and performance of the study should be directed by the Region to ensure that the study results in the type and quality of data needed to support the decision.

TREATABILITY STUDY PROTOCOLS

Treatability studies need to be carefully planned to ensure that sufficient data of known, documented, and appropriate quality are generated to support the decision. The site-specific treatability study protocol is outlined in the Work Plan and the Sampling and Analysis Plan. These plans should, among other things, clearly describe: the experimental design, the treatability study goals, the Quality Assurance Project Plan, data management and interpretation, and reporting.

The treatability study work assignment is to require that the treatability study be developed in accordance with Agency guidance, factoring in literature, site-specific information, and expert consultation. The "Guide for Conducting Treatability Studies Under CERCLA" provides a general approach for treatability studies and provides a protocol for the preparation of the Work Assignment, Work Plan, Sampling and Analysis Plan, Health and Safety Plan, and the Community Relations Plan. The Agency also is developing a number of technology-specific treatability guidances which should be followed: the first of these on soil washing is scheduled to be issued in the second quarter of FY 1990. For more information on these documents, other sources of treatability study information, and for technical assistance in reviewing and performing treatability studies please contact Ben Blaney (ORD) at FTS/684-7406 or com. 513/596-7406.

TREATABILITY STUDY REPORT

The Agency has initiated an effort to ensure the consistency of treatability study reports and to provide a central repository of treatability studies to facilitate information dissemination. The "Guide for Conducting Treatability Studies under CERCLA" contains a standard report format that is to be followed for all treatability study reports. All work assignments and consent decrees are to contain a statement requiring that documents be developed in accordance with Agency policy.

Further, all Fund-lead and enforcement-lead oversight treatability work assignments are to include a provision requiring that a camera-ready master copy of the treatability study report be sent to the following address:

Attn: Ken Dostal
U.S. Environmental Protection Agency
Superfund Treatability Data Base
ORD/RREL
26 W. Martin Luther King Drive
Cincinnati, Ohio 45268

Information contained in these reports will be available through the Alternative Treatment Technology Information Center (ATTIC). For more information on ATTIC please call FTS 382-5747 or com. 202/382-5747.

TECHNICAL ASSISTANCE

Literature information and consultation with experts are critical factors in determining the need for and ensuring the usefulness of treatability studies. A reference list of sources on treatability studies is provided in the "Guide for Conducting Treatability Studies Under CERCLA."

It is recommended that a Technical Advisory Committee (TAC) be used. This committee may include experts on the technology(ies) to provide technical support from the scoping phase of the treatability study through data evaluation. Members of the TAC may include representatives from EPA (Region and/or ORD), other Federal Agencies, States, and consulting firms. Technical assistance may be obtained through the following:

- The Office of Research and Development (ORD) provides technical assistance on site remediation and treatability studies. The Superfund Technical Assistance Response Team (START) provides long-term site-specific support from the scoping phase through remedial design for sites identified by Regional management and selected for START support. The Technical Support Project (TSP) provides short-term support of a similar nature. ORD assistance in the planning, performance, and/or review of treatability studies can be accessed through either mechanism. ORD also has the Treatability Assistance Program (TAP) which is developing technology-specific treatability study protocols, bulletins, and a computerized database. For further information on treatability study support or the TAP please contact Ben Blaney (ORD) at FTS 684-7406 or com. 513/569-7406, Rich Steimle (OSWER) at FTS 382-7914 or com. 202/382-7914, or a Regional Forum member.
- Bureau of Mines (BOM) has technical expertise and experience in the development of technologies to remove metals and other inorganic chemicals from solids and liquids. Contact William Schmidt at FTS 634-1210 or com. 202/634-1210 for information.
- The U.S. Army Corps of Engineers (COE) may perform or oversee treatability studies required for RI/FS or RD/RA. For information, contact Joe Grasso (COE) at com. 402/691-4532.

FOR FURTHER INFORMATION

In addition to the contacts identified above, the appropriate Regional Coordinator for each Region located in the Hazardous Site Control Division/Office of Emergency and Remedial Response or the CERCLA Enforcement Division/Office of Waste Programs Enforcement should be contacted for additional information or assistance.

Treatability Studies
Definition:

Research conducted on a specific waste to determine whether or not a treatment, or combination of treatments, will effectively reduce the hazardous nature of the waste.

Why Conduct a Treatability Study?

- Statutory mandate (SARA)
  permanent solutions
  innovative treatments
- Maximum extent practicable (MEP)
- Evaluation of a technology for a ROD

Timing of Treatability Studies.

- Early, concurrent with feasibility studies.
- Information can be gathered at listing.

Types of Treatability Studies.

- Technology screening, based upon:
  1. Chemical/physical characteristics.
  2. The matrix in which the waste is found.
  3. The concentration of the waste.
  4. Published information.

Types of Treatability Studies.

- Laboratory scale:
  1. Small quantities, quick results.
  2. Batch reactions, yes/no answers.
  3. Low cost, new technologies.
  4. Scale-up, design problems.

Types of Treatability Studies.

- Bench scale:
  1. Small reactor systems.
  2. Batch or flow-thru, more involved than lab scale.
  3. More expensive than lab scale
  4. Yields information on effectiveness and cost.
  5. Scale-up problems.

Types of Treatability Studies.

- Pilot scale:
  1. Larger reactor systems.
  2. Typically flow-thru designs, prototype of full-scale.
  3. Highest cost.
  4. Should be large enough to minimize scale-up problems.
  5. Eliminate design flaws.

Information Acquisition

- Training courses, conferences.
- Venders, contractors.
- Publications, bulletin boards.
- Data bases.

Identify Waste Media
Technologies are Media Specific

- Aqueous
- Sludge
- Soil
- Waste

Data Requirements

- Existing site information.
- Data Quality Objectives.
- Adequate site data?
- Information needed for technology evaluation.
  TOC
  pH
  clay content
  withdrawl rate
  others

RCRA Exclusion Rule
Treatability Studies

Exempts waste samples from permit requirements. One-time exclusion of 1,000 kg/waste stream per treatment process.

Only effective in non-RCRA authorized states.

Who Conducts the Study?

- Vendors
- Consultants
- Federal agencies

Ask for references!

Product

- Progress reports.
  Specify frequency.
- Draft report.
- Chemical analysis of media.

Treatability Study Work Plan

- Good reporting requirements.
- Comply with RI/FS scedule.
- Determine study cost.
- Specific to your needs.
  Demonstrate effectiveness?
  Cost estimate?
  Health and safety plan?
  QA/QC plan.
  Residuals?
  Design parameters?
  Timing?

Cost Estimate

- Mobilization/demobilization.
- Capital costs.
- Labor.
- Power/utilities.
- Materials.
- Materials handling.

Lessons Learned

The Textbook Isn't Always Right!

- Your best interests?
- Are all your eggs
  in one basket?
  Technology: Can't be used.
  Expense.
  Construction.
- Goals keyed to the RI/FS?
  Data used for study & RI/FS.
  Communication between
  contractors/vendors.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 12 1989

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive # 9380.3-01

MEMORANDUM

SUBJECT: Treatability Studies Contractor Work Assignments

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response
Walter W. Kovalick Jr for

TO: Superfund Branch Chiefs, Regions I-X

Purpose

The purpose of this memo is to require that all future remedial and removal work assignments involving treatability studies contain a provision requiring the contractor to send a copy of the treatability study to the Agency's Superfund Treatability Data Base which is being developed by the Office of Research and Development (ORD). In addition, you are also directed to send a copy of all treatability studies performed to date and which are readily available, to this central repository.

Background

The Agency has initiated a treatability study program to facilitate the performance of and improve the quality of treatability studies performed in support of the Superfund program. The establishment of a Treatability Data Base is an important part of this program if we are to utilize this information to aid in the selection of remedies and the planning of future treatability studies. A centralized repository for treatability studies is not currently in place and knowledge gained from treatability studies is not efficiently communicated. ORD is developing a repository for the studies to aid us in this area.

This repository will provide information to aid in remedy selections on a site-specific basis, improve future planning for treatability studies, and further our knowledge of technologies on a national basis. It is our intention to minimize Regional resources required to maintain the data base in the future by requiring the contractors to assume responsibility for sending treatability studies to the central repository. The treatability studies collected as a result of this effort will ensure that information available reflects current Superfund experience.

The treatability study information as well as other pertinent technical information, will be available to the Regions and contractors through the Alternative Treatment Technology Information Center (ATTIC) in FY 1990. Please contact Mike Mastracci at FTS 475-8933 (mail code RD-681 at the U.S. EPA HQ).

Implementation

Work assignment managers and project officers for removal and the remedial projects are to include a provision in all future work assignments requiring that copies of treatability studies be sent to the following address:

Attn: Ken Dostle
U.S. Environmental Protection Agency
Superfund Treatability Data Base
ORD/REEL
26 W. Martin Luther King Drive
Cincinnati, Ohio 45268

The work assignment should also require that the treatability study report provided to ORD be a separate and complete document which is a camera-ready master copy. We are also collecting treatability studies retroactively as well. You are directed to send copies of all treatability studies that are readily available to the address identified above.

The Agency is also developing detailed guidance on planning and performing treatability studies with the first of these planned for distribution in early FY-90. Today's memo will be updated in the future to require that contractors comply with these guidances as well. Your assistance with the development and implementation of this program is appreciated. Please contact Robin Anderson at FTS 382-2446 or Scott Maid at FTS 382-4671 if you have question or comments on the application of this requirement to the remedial or removal program respectively.

cc: OHM Coordinators, Regions I-X
ARC Project Officers, Regions I-X
ERCS Project Officers, Region I-X
REM Project Officers (OERR)
Russ Wyer (OERR/HSCD)
Tim Fields (OERR/ERD)
Scott Maid (OERR/ERD)
Robin Anderson (OERR/HSCD)
Mike Mastracci (ORD)
Ken Dostle (ORD)
Betti Van Epp (OERR/OPM)
Joseph Lafornara (OERR/ERT)